CLAIMS

[Claim 1]

A vacuum heat insulating material comprising a core material formed of a fiber assembly and an outer cover material covering the core material, with an interior of the outer cover material reduced in pressure and sealed,

wherein a weight ratio of fiber having a fiber length of 1.85 mm or less in the core material is 11 wt% or less of an entirety of the core material.

[Claim 2]

The vacuum heat insulating material of claim 1, wherein a fiber angle representing a direction of the fiber having the fiber length of 1.85 mm or less relative to a plane perpendicular to a heat insulating direction of the core material has a mean of 14 degrees or less.

[Claim 3]

The vacuum heat insulating material of claim 2, wherein a standard deviation of the fiber angle of the fiber having the fiber length of 1.85 mm or less relative to the plane perpendicular to the heat insulating direction of the core material is 12 degrees or less.

[Claim 4]

A heat insulating box comprising an external box and an internal box disposed inside the external box,

wherein the vacuum heat insulating material of any one of claims 1 to 3 is disposed between the external box and the internal box.

[Claim 5]

A manufacturing method of a vacuum hea

t insulating material comprising:

a step of repeatedly compressing an assembly of glass fiber a preset number of times under a preset pressure in a thickness direction with a load-

controllable compression mechanism, to thereby form a core material in which a weight ratio of fiber having a fiber length of 1.85 mm or less is 11 wt% or less;

a step of inserting the core material into an outer cover material, and reducing pressure in an interior of the outer cover material to a preset vacuum degree; and

a step of sealing an opening port of the outer cover material while the outer cover material is reduced in pressure.

[Claim 6]

The manufacturing method of a vacuum heat insulating material of claim 5, wherein the assembly of glass fiber is compressed 50 to 1000 times under a pressure of 0.02 to 0.07 MPa with the compression mechanism.

CLAIMS

[Claim 1]

A vacuum heat insulating material comprising a core material formed of a fiber assembly and an outer cover material covering the core material, with an interior of the outer cover material reduced in pressure and sealed,

wherein a weight ratio of fiber having a fiber length of 1.85 mm or less in the core material is 11 wt% or less of an entirety of the core material.

[Claim 2]

The vacuum heat insulating material of claim 1, wherein a fiber angle representing a direction of a fiber constituting the core material relative to a plane perpendicular to a heat insulating direction of the core material has a mean of 14 degrees or less.

[Claim 3]

The vacuum heat insulating material of claim 2, wherein a standard deviation of the fiber angle of the fiber constituting the core material relative to the plane perpendicular to the heat insulating direction of the core material is 12 degrees or less.

[Claim 4]

A heat insulating box comprising an external box and an internal box disposed inside the external box,

wherein the vacuum heat insulating material of any one of claims 1 to 3 is disposed between the external box and the internal box.

[Claim 5]

A manufacturing method of a vacuum heat insulating material comprising:

a step of repeatedly compressing an assembly of glass fiber a preset number of times under a preset pressure in a thickness direction with a load-

controllable compression mechanism, to thereby form a core material in which a weight ratio of fiber having a fiber length of 1.85 mm or less is 11 wt% or less;

a step of inserting the core material into an outer cover material, and reducing pressure in an interior of the outer cover material to a preset vacuum degree; and

a step of sealing an opening port of the outer cover material while the outer cover material is reduced in pressure.

[Claim 6]

The manufacturing method of a vacuum heat insulating material of claim 5, wherein the assembly of glass fiber is compressed 50 to 1000 times under a pressure of 0.02 to 0.07 MPa with the compression mechanism.